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WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By P. C. DAY

GENERAL SUMMARY

The chief features of the weather for December, 1929, were the severe cold during the early part of the third decade over the interior valleys; the excessive precipitation over portions of southern Florida on the 10th and 11th; the breaking of the prolonged drought in the far Northwest near the end of the first decade; and the unusual and protracted prevalence of fog over many of the interior and eastern districts near the middle of the month.

PRESSURE AND WINDS

The month opened with cyclonic conditions existing in the Great Plains and with light snow from Montana eastward and southeastward to the Mississippi Valley and portions of the upper Lake region. By the morning of the 2d the cyclonic conditions had separated into two distinct areas, one central over Lake Huron and the other over the northern Gulf region, and precipitation covered the intervening areas from the eastern Plains to near the Atlantic coast, snow continuing over the northern districts and rain in the Central and Southern States. During the following day the precipitation area moved off the Atlantic coast, and fair weather had become established in most districts to the west, continuing in practically all districts until the morning of the 7th.

On that date slight precipitation was recorded at a few points in the far Northwest, followed at a few other points in that region by additional precipitation on the 8th and by the 9th precipitation had overspread the entire region from central California northward and to the eastward as far as the Rocky Mountains, thus ending the long period of drought in that region.

During this period general but mostly light precipitation occurred over much of the eastern part of the country, some snow falling along the northern border. Following the 9th precipitation continued in the far Northwest, the rains becoming heavy at a few points near the coast and the precipitation changed to snow as the area moved eastward into the near-by mountain regions.

By the morning of the 11th precipitation had extended eastward, and light snow or rain fell over extensive areas along the northern border, continuing during the 11th, 12th, and 13th over portions of the same area.

On the morning of the 14th precipitation again became heavy at points near the north Pacific coast, while to the eastward there were occasional rains with local snows in a few more northern sections. At the same time fog was reported from many Central and Eastern States, continuing with some precipitation during the 16th and 17th. On the last-mentioned date an extensive storm area had moved to the southern Plains and generally light precipitation had overspread much of the country from the far Northwest eastward and southeastward to the Appalachian Mountains. By the morning of the 18th the precipitation had become heavy in many central districts and rain had changed to snow from the lower Mississippi Valley eastward to the Lake region and to snow or sleet in portions of the Ohio Valley, while fog continued over many Atlantic coast districts to which precipitation had now extended. On the 19th snow continued in the districts from the lower Mississippi Valley eastward to the Middle Gulf States, snow reaching southward to the middle of those States and precipitation, mostly rain, cov-

ered all eastern districts, fog continuing over many middle and north Atlantic coast districts, the storm continuing during the 20th over a large area from the lower Mississippi Valley northeast to New England and disappearing over the lower St. Lawrence Valley, during the 21st.

About the 18th to 20th considerable precipitation occurred in the far West, gradually extending eastward into the Rocky Mountains, and by Saturday, December 21, snow had set in over central Texas which continued during the following day, extending northeastward into Tennessee, and by the morning of the 21st had reached the eastern portions of the Carolinas, and precipitation was occurring from the southern and middle Mississippi Valley and the southern Lake region eastward to the Atlantic coast, snow falling in the Ohio Valley and near-by areas, while rains had fallen near the Atlantic coast. This storm passed rapidly to southern New England by the 24th, attended by some local heavy snows, and moved thence northeastward over the near-by Canadian Provinces on Christmas Day.

On the 25th light rains overspread the north Pacific coast and centered in the same general area for several days, but otherwise in the far West there was little precipitation during the closing days of the month and there was generally no important precipitation during this period over the other portions of the country.

The distribution of the monthly means of pressure for the United States and Canada is graphically shown on Chart No. VI of this REVIEW, and the departures of these from the normal and their changes from the preceding month are likewise shown on the insets to Charts II and III of the same publication.

Generally speaking, there were few cyclonic storms of sufficient intensity to cause damaging winds over extensive areas and hence such storms were infrequent, as shown by the few instances recorded in the table at the end of this section.

Important ice or glaze storms, however, occurred over several extensive areas where damage was caused by the breaking of trees and shrubs from the heavy accumulations of ice, or where overhead wires of all kinds were damaged by the loads of ice carried.

These glaze or ice storms occurred as far south as the vicinity of Corpus Christi, Tex., and northward as far as Buffalo and Oswego, N. Y., and were extensively destructive in certain localities between. Special mention may be made of these storms in portions of western New York on the 17th and 18th, when untold damage occurred to trees which will take years to repair, and great damage resulted to overhead wires of all kinds. Similar storms on the same dates caused much damage over wide areas in southern Michigan and portions of Illinois, Indiana, and Ohio, while even as far south as Texas damage to wires resulted from these storms and cattle suffered severely from the attending icy conditions.

TEMPERATURE

During the greater part of the month temperatures were moderate and the daily changes were chiefly unimportant and frequently not as much as 20°. Important changes occurred during the first three days, the temperature falling to fairly low points in the Northwest and Central States and rising to normal or above over eastern districts. The week ended December 10 was mainly moderate, though distinctly warm for midwinter in some southern and most western districts.

The week ended December 17 was warmer than normal over the greater part of the country, in fact, it was unusually warm in all central and southern districts, the weekly departures from their normals ranging up to 10° to 20° or more over a wide area extending from the East Gulf States to the northern Plateau, the only section having temperatures below the normal being small areas along the extreme northern border.

The week ending December 24, however, had some sharp changes in temperature and was decidedly cold over most central and eastern districts during the first few days. The averages for the week were below normal from the Rocky Mountains to the Mississippi Valley, but they were moderately above normal over the middle Atlantic coast and generally to westward of the Plateau region. The final week was warm for the season, the weekly means averaging well above normal over all interior and northern districts, the departures ranging from +15° to +18° along the northern border to smaller values along the Mexican border and over the west Gulf States. The only portions having temperatures below the normal were a small area over the Southeastern States and a similar area along the middle Pacific coast.

For the month as a whole the temperatures were above the normal over the greater part of the United States, but in Canada there appear to have been considerable areas with monthly means below normal, though the departures seem not to have been large. Over the Missouri Valley and thence eastward to the Atlantic coast the temperatures were generally below the normal and similar conditions existed over most of the Gulf States. Elsewhere the temperatures were above normal, the month being particularly warm in the districts from the Rocky Mountains westward to the Pacific; in portions of this area, notably the central Rocky Mountains and sections near by, both east and west, the mean temperatures were among the highest of record and in a few instances they were materially higher than during the preceding November.

The extremes of temperature were mainly within the usual range, the maximum rising to 90° only in Florida and California, while along the northern border they were mainly not higher than 60°. Minimum temperatures below zero occurred at some points in all the States save a few in the extreme Southeast and in California and Washington. The lowest reported was -47° at a point in the mountains of Montana and they were below zero at points as far south as Texas and Louisiana.

PRECIPITATION

December brought less than normal precipitation to about two-thirds of the States. From the Ohio River southward to the Gulf the deficiencies were considerable, and for the most part the middle and southern Plains received much less than normal, but these regions usually had received sufficient precipitation during November preceding.

Several Atlantic Coast States and all of the middle Rocky Mountain region failed to receive the normal December quantities, yet almost everywhere had enough moisture for present needs. In the far Southwest and over most of the middle Plateau the situation was less fortunate, for the precipitation shortage noted before December began became still more marked, Arizona and southern California especially receiving no moisture of importance before the year ended.

The unusually protracted drought in the northern half of California and throughout Oregon and Washington was wholly or considerably relieved by liberal precipita-

tion, mainly rain, which started late in the first decade of December. In Oregon the precipitation averaged more than 50 per cent above normal; this was the first month since March, 1928, to have an average precipitation as great as 5 inches, and only the fourth month since that one to furnish the State more rain than the normal for the month.

The States of the northern border, from Washington eastward to North Dakota, recorded an excess of precipitation, most of Montana registering nearly, or more than, twice the normal. Central and northern Indiana and large parts of the States adjoining received more than normal and excesses were reported from many parts of New York and New England, and from the southeastern portions of the Carolinas.

In Florida the rainfall averaged about normal for the month, but the distribution was irregular. Miami recorded over 9 inches, or over five times the December normal. About three-fifths of this monthly amount occurred on the 10th and 11th, in the heaviest rain of local record for any December. This was the fourth time since the middle of September that a quantity exceeding 4 inches was measured within the space of 24 hours at the Miami station.

SNOWFALL

Two positive features of December's snowfall deserve special comment. One is the marked southward extension of the area in which snow of importance occurred. From central Texas eastward to Georgia depths of from 3 to 20 inches were noted over most interior counties, and traces of snow reached the Gulf coast, all or almost all in connection with the storm of the 20th to 22d. The other feature was the heavy snowfall of the 18th to 20th over most of the Lake region and the northern part of the Ohio Valley. The snow here drifted badly and serious blocking of highways resulted.

From the southern portion of the upper Lakes southward to the central Appalachians the month's snowfall was considerably greater than the average December quantity; while the States bordering the Gulf from Texas to Alabama reported the greatest average snowfall of December record, some of them receiving many times more than in any previous December.

The leading negative feature was the scarcity, and for many districts the complete absence of snowfall in the higher portions of the far Southwest. Almost all portions of Arizona and southern California either received no snowfall whatever or decidedly little in comparison with what is expected.

The situation was similar, though not so notable, further to northward and northeastward. From southern Colorado westward to north-central California practically all high areas received very much less than the normal December quantity of snow.

The outlook for water flow in the West next summer was not favorable at the end of December, save in a few northern districts. However, snowfall during January has greatly improved the situation in many of the western States.

Nearly all portions of the Plains recorded less snowfall in December than normal, and some central portions very much less. In the Atlantic States the December snowfall varied considerably but usually exceeded the normal, especially in the portions most remote from the coast.

HUMIDITY AND CLOUDS

The percentage of the relative humidity was mainly above the normal from the Missouri Valley eastward and

southeastward to the Lake region and Ohio Valley, locally in portions of the Atlantic and Gulf States and along the Pacific coast. There were wide deficiencies in most of the Rocky Mountain and Plateau regions and in the nearby-southern Great Plains.

The most notable fact in connection with the record of the state of the weather was the extent of fog over wide areas and its persistence during the middle period of the month. This condition was particularly observed over much of the Middle West from near the end of the first decade, continuing in some cases daily in that region

and extending over wide regions eastward and southeastward to the Atlantic coast until well after the middle of the month. In portions of these areas dense fog existed continuously for a week or more exceeding in some localities any previous record of such conditions in the weather history of the places. Much cloudy weather, with frequent, though mainly light precipitation, prevailed in many regions covering the eastern two-thirds of the country, particularly over the Lake regions and to the eastward and into the near-by areas.

SEVERE LOCAL STORMS, DECEMBER, 1929

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
New York (western).....	7-8					Ice.....	Some damage to telephone and power lines; auto traffic made hazardous.	Official, U. S. Weather Bureau.
Fort Smith, Ark.....	17	2:45 p. m.				Tornado.....	Slight damage over path one-fourth mile long.	Do.
Grannis, Ark.....	17	3:30 p. m.				do.....	Slight property damage.	Do.
Ville Platte, La. (10 miles east of).....	17	11 p. m.	100-150		\$6,000	do.....	Buildings and a cotton gin damaged.	Do.
Illinois, Indiana, and Ohio (northern parts) of southern Michigan and western New York.....	17-19					Ice, snow, and wind.....	Public utilities badly crippled; trees broken; highways obstructed; numerous accidents. The storm was particularly severe in Buffalo and vicinity.	Do.
Tupelo, Miss.....	18	3 a. m.				Tornado.....	A garage wrecked.	Do.
Georgia (central).....	22					Snow and ice.....	Considerable damage to telephone and telegraph poles and wires, trees, and shrubbery.	Do.
Washington (western).....	25			1		Wind.....	Wires, signs, poles, trees, small craft, and buildings damaged.	Do.

RIVERS AND FLOODS

By R. E. SPENCER

No floods of importance occurred in the rivers of the United States during December, 1929. Flood stages were reached or slightly exceeded in several districts, as indicated in the table following, but no damage of consequence occurred.

Flood stage and crest data

[All dates in December unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC DRAINAGE					
Neuse: Smithfield, N. C.....	Feet 14	4	4	14.0	4
Cape Fear: Elizabethtown, N. C.....	22	5	6	24.0	5
Peedee:					
Mars Bluff, S. C.....	17	{ (1)	1	17.0	{ Nov. 30-
			5	11	Dec. 1
Poston, S. C.....	18		8	13	19.0
Santee:					18.8
Rimini, S. C.....	12	{ (1)	11	14.6	10
			16	23	12.8
Ferguson, S. C.....	12	(1)	(1)	21.0	21-22
Saluda: Chappells, S. C.....	14	4	4	14.4	Oct. 7
					4
EAST GULF DRAINAGE					
Tombigbee: Lock No. 4, Demopolis, Ala.....	39	(1)	4	63.7	Nov. 21-22
Pearl: Jackson, Miss.....	20	(1)	1	25.8	Nov. 23-26
West Pearl: Pearl River, La.....	13	(1)	12	16.3	Nov. 18
GREAT LAKES DRAINAGE					
Maumee: Fort Wayne, Ind.....	15	18	20	16.5	18
St. Joseph: Montpelier, Ohio.....	10	19		10.4	19

1 Continued from last month.

2 Continued at end of month.

Flood stage and crest data—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI DRAINAGE					
Walhonding: Walhonding, Ohio.....	Feet 8	18	19	9.3	19
Scioto:					
Larue, Ohio.....	11	14	14	12.3	14
Bellpoint, Ohio.....	9	18	19	12.7	18
Circleville, Ohio.....	10	21	21	9.3	21
Chillicothe, Ohio.....	16	15	15	10.3	15
Wabash:		19	20	12.9	19
Lafayette, Ind.....	16	20	21	17.6	21
Lafayette, Ind.....	13	19	21	16.5	19
Covington, Ind.....	16	17	22	19.7	20-21
Terre Haute, Ind.....	16	18	23	16.8	20-21
Vincennes, Ind.....	14	25	26	14.3	26
Mount Carmel, Ill.....	16	20	29	19.5	27
White: Decker, Ind.....	18	24	26	18.5	26
White, East Fork: Seymour, Ind.....	10	19	20	11.0	20
White, West Fork:					
Elliston, Ind.....	19	18	22	22.3	20
Edwardsport, Ind.....	15	18	24	18.3	23
Illinois: Peru, Ill.....	14	3	6	14.7	5
		22	22	14.2	22
		26	28	14.6	27
St. Francis:					
Fisk, Mo.....	20	19	21	22.0	20
St. Francis, Ark.....	18	24	25	18.3	25
Black: Corning, Ark.....	11	18	27	12.5	22
Sulphur: Ringo Crossing, Tex.....	20	17	17	22.0	17
PACIFIC DRAINAGE					
Willamette:					
Eugene, Oreg.....	12	19	19	14.0	19
Harrisburg, Oreg.....	10	19	20	14.4	19
Albany, Oreg.....	20	21	21	20.9	21
Willamette, Coast Fork: Saginaw, Oreg.....	9	18	19	10.0	18
Santiam: Jefferson, Oreg.....	10	15	15	11.0	15
		19	19	13.8	19